



**MICHIGAN DEPARTMENT OF NATURAL RESOURCES**  
**Wildlife Division Report No. 3544**  
**June 2012**

Printed by Authority of: P.A. 451 of 1994  
Total Number of Copies Printed: .....25  
Cost per Copy:.....\$1.75  
Total Cost: .....\$43.75

Michigan Department of Natural Resources

## **2009 WATERFOWL HARVEST SURVEY**

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### **ABSTRACT**

*A sample of waterfowl hunters was contacted after the 2009 hunting seasons to estimate hunting activity and determine opinions and satisfaction with hunting regulations. Waterfowl hunting license sales were similar between 2008 and 2009, and the number of people hunting ducks and geese was not significantly different between 2008 and 2009. In 2009, about 50,064 people hunted waterfowl in Michigan (nearly 42,554 duck hunters and 36,202 goose hunters). Satisfaction with waterfowl numbers, hunting experience, and hunting season dates among duck and goose hunters was similar between 2008 and 2009. An estimated 3,146 youth hunters (10-15 years old) participated during the 2-day youth waterfowl hunting season. Duck hunters were asked to indicate their preferred opening date for the 2010 duck hunting season (i.e., September 25, October 2, October 9, or October 16). Among hunters that preferred to hunt in the South Zone, the most popular date to begin the 2010 duck hunting season was October 9. Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2010 duck hunting season on September 25 or October 2. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2010 duck hunting season was September 25.*

### **INTRODUCTION**

The Michigan Natural Resources Commission and Department of Natural Resources (DNR) have authority and responsibility to protect and manage wildlife resources in the state of Michigan. This responsibility is shared with the U.S. Fish and Wildlife Service (USFWS) and other state and provincial wildlife management agencies for the management of migratory birds such as ducks (Anatinae) and geese (*Branta* and *Anser* spp.). Harvest surveys are one



A contribution of Federal Aid in Wildlife Restoration, Michigan Project W-147-R

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of the management tools used by the Wildlife Division in developing regulations. Estimating harvest and hunting effort are among the primary objectives of these surveys. Estimates derived from harvest surveys, as well as breeding bird abundance and population models, are used to develop harvest regulations that provide sustainable recreational hunting and viewing opportunities of migratory game birds. Wildlife management agencies also consider hunter opinions and desires when establishing regulations.

Waterfowl could be harvested during hunting seasons that occurred September 1, 2009, through January 31, 2010, (Table 1) by a person possessing both a waterfowl and a small game hunting license (includes resident, nonresident, 3-day nonresident, resident junior, and senior small game hunting licenses). Waterfowl hunters also had to obtain a federal waterfowl stamp and register with the National Migratory Bird Harvest Information Program (HIP). Hunters younger than 16 years of age could hunt waterfowl without a waterfowl hunting license or a federal waterfowl stamp; however, they still were required to purchase a small game license and register with the HIP.

The HIP is a cooperative effort between state wildlife agencies and the USFWS. It was implemented to improve knowledge about harvest of migratory game birds (e.g., ducks, geese, and woodcock [*Scolopax minor*]). Beginning in 1995, any person who hunted migratory game birds in Michigan was required to register with the HIP and answer several questions about their hunting experience during the previous year. The HIP provided the USFWS with a national registry of migratory bird hunters from which they can select participants for Federal harvest surveys.

State wildlife agencies select specific regulations, such as hunting season dates, within overall frameworks (e.g., number of days of hunting and bag limits) set by the USFWS. Both waterfowl population status and hunter attitudes are used when developing Michigan waterfowl hunting regulations. Although estimating harvest, hunter numbers, and hunting effort were the primary objectives of the waterfowl harvest survey, this survey also provided an opportunity to collect information about management issues. Questions were added to the questionnaire to estimate hunters' opinions and satisfaction with hunting regulations and waterfowl numbers.

## **METHODS**

Following the 2009 hunting seasons, a questionnaire (Appendix A) was sent to 5,982 randomly selected people that were eligible to hunt waterfowl in Michigan. The people selected were grouped into one of two strata on the basis of their age, licenses purchased, and whether they had registered with the HIP. The first stratum consisted of people at least 16 years old that had purchased a waterfowl hunting license. The second stratum consisted of people 10-15 years old during September 1, 2009, and February 1, 2010, that had registered with the HIP by February 1, 2010. The overall sample consisted of 4,866 people from the first stratum (N=58,112), and 1,116 people from the second stratum (N=12,900).

Questionnaires were mailed initially in late March. Up to two follow-up questionnaires were sent to non-respondents. Hunters were asked to report whether they hunted, locations hunted (county and management zone), type of land on which hunt occurred (public or

private lands), number of days spent afield, and number of waterfowl harvested. Hunters were also asked to rate their overall hunting experience and indicate satisfaction with hunting regulations (e.g., season dates and bag limits). Questionnaires were undeliverable to 109 people, primarily because of changes in residence. Questionnaires were returned by 3,404 of 5,873 people receiving the questionnaire (58% response rate).

Estimates were calculated using a stratified random sampling design (Cochran 1977). Using stratification, hunters were placed into similar groups (strata) based on their age, licenses purchased, and whether they had registered with the HIP. Then estimates were derived for each group separately. The statewide estimate was then derived by combining group estimates so the influence of each group matched the proportion its members occurred in the statewide population of hunters. The primary reason for using a stratified sampling design was to produce more precise estimates. Improved precision means similar estimates should be obtained if this survey were to be repeated.

Estimates were derived separately for the Upper Peninsula (UP), Northern Lower Peninsula (NLP), and Southern Lower Peninsula (SLP, Figure 1). These areas are consistent with areas used for estimation in previous years, although they do not match formal management zones. Estimates were also calculated separately for waterfowl management zones. Hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest. Estimates were calculated along with their 95% confidence limit (CL). In theory, this confidence limit can be added and subtracted from the estimate to calculate the 95% confidence interval. The confidence interval is a measure of the precision associated with the estimate and implies the true value would be within this interval 95 times out of 100. Unfortunately, there are several other possible sources of error in surveys that are probably more serious than theoretical calculations of sampling error. They include failure of participants to provide answers (nonresponse bias), question wording, and question order. It is difficult to measure these biases. Thus, estimates were not adjusted for possible bias.

Statistical tests are used routinely to determine the likelihood that differences among estimates are larger than expected by chance alone. The overlap of 95% confidence intervals was used to determine whether estimates differed. Non-overlapping 95% confidence intervals was equivalent to stating the difference between the means was larger than would be expected 995 out of 1,000 times ( $P < 0.005$ ), if the study had been repeated (Payton et al. 2003).

## **RESULTS**

### **License sales and hunter participation**

In 2009, 58,209 people purchased a Michigan waterfowl hunting license (Table 2). The average age of people that purchased a waterfowl hunting license was 43 years (Figure 2). About 2% (870) of waterfowl license buyers were younger than 17 years old. Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license; thus, the count of youth license buyers failed to include all youth waterfowl hunters. About 98% of the waterfowl hunting license buyers were males.

An estimated 50,064 people went afield to hunt waterfowl in 2009 (Table 3). The mean age of the active waterfowl hunter was 41 years, and about 11% of the active hunters were less than 17 years old (4,923 youth hunters). About  $63 \pm 2\%$  of the people eligible to hunt waterfowl spent time hunting ducks or geese. About  $68 \pm 2\%$  of the people that had purchased a waterfowl hunting license (stratum 1) hunted waterfowl. In contrast,  $40 \pm 4\%$  of the people less than 16 years old that had registered with the HIP (stratum 2) hunted waterfowl. An estimated 42,554 duck hunters spent 326,380 days afield; while an estimated 36,202 goose hunters spent 271,150 days afield (Tables 4 and 5). About  $40 \pm 2\%$  ( $28,691 \pm 1,123$ ) of those eligible to hunt waterfowl attempted hunting both ducks and geese.

An estimated  $3,146 \pm 461$  youth hunters (10-15 years old) participated during the 2-day youth waterfowl hunting season. About  $24 \pm 4\%$  of the youth hunters eligible to hunt during the youth season actually participated. An estimated  $22 \pm 2\%$  of adult (at least 18 years old) waterfowl hunters active in 2009 ( $9,351 \pm 762$ ) accompanied at least one youth during the 2-day youth waterfowl hunting season. (More than one adult could report hunting with the same youth; thus, the estimated number of adults hunting with a youth was greater than the number of youth hunting during the youth season.)

### **Harvest and hunting trends**

The number of active duck hunters statewide (all seasons combined), hunting effort, and harvest did not change significantly between 2008 and 2009 (Tables 4-7). The number of goose hunters, their hunting effort, and harvest also did not change significantly statewide (all seasons combined) between 2008 and 2009 (Tables 4-6 and 8).

### **Hunter opinions**

An estimated 57% of the Michigan duck hunters were satisfied with their duck hunting experience in 2009, 21% had a neutral opinion about their experience, while 20% of duck hunters were dissatisfied (Table 9). Satisfaction among goose hunters with their goose hunting experience was similar to the satisfaction levels reported for duck hunting.

Nearly 50% of Michigan duck hunters were satisfied with the 2009 duck hunting season dates, length of the duck season, and the daily duck limit (Table 9). About 43% of the duck hunters reported they were satisfied with the number of ducks seen in 2009, but only 29% of duck hunters were satisfied with the number of ducks harvested. Similarly, about 58% of goose hunters were satisfied with the number of geese seen in 2009, but only 33% of goose hunters were satisfied with the number of geese harvested.

Most ( $65 \pm 2\%$ ) duck hunters preferred to hunt in the South Zone, while  $23 \pm 2\%$  of duck hunters preferred to hunt in the Middle Zone and  $11 \pm 1\%$  preferred to hunt in the North Zone. About  $2 \pm 1\%$  of the duck hunters did not indicate a preferred hunt zone. Among hunters that preferred to hunt in the South Zone, the most popular date to begin the 2010 duck hunting season was October 9 (Table 10). Among hunters who preferred to hunt in the Middle Zone, nearly equal proportions preferred to begin the 2010 duck hunting season on September 25 or October 2. Among hunters that preferred to hunt in the North Zone, the most popular date to begin the 2010 duck hunting season was September 25.

Duck hunters were divided in their opinion about maintaining split seasons (i.e., seasons broken into two segments) for 2010 (Table 11). About 49% of duck hunters favored having split seasons, and most of these hunters preferred to maintain the splits as done in 2009 (see Table 1 for 2009 season dates). In contrast, 13% of duck hunters preferred a continuous season in 2010. In addition 18% of duck hunters were undecided and 3% of hunters did not indicate a preference.

Among active duck and goose hunters, there were no dates for the 2-day youth waterfowl hunting season in 2010 that was favored by most hunters. An estimated  $36 \pm 2\%$  of hunters reported they were undecided about the preferred dates. In contrast,  $17 \pm 2\%$  of hunters preferred the youth season be held during September 11-12 and  $27 \pm 2\%$  preferred a September 18-19 season. An estimated  $17 \pm 2\%$  of waterfowl hunters preferred to eliminate the youth waterfowl hunting season. In addition  $10 \pm 1\%$  of hunters did not provide an answer or selected another date for the youth season.

About  $76 \pm 4\%$  of youth hunters eligible to hunt during the youth season (10-15 years old during September 19-20) did not participate. The most commonly selected reason why these youth did not participate was lack of time to hunt waterfowl because they were involved in other non-hunting activities (36%, Table 12). About 21% of youth reported they were unaware of the youth waterfowl hunting season, and 20% indicated that they were too busy to participate because their time was devoted to other hunting activities.

## DISCUSSION

Raftovich et al. (2010) reported estimates of harvest, hunter numbers, and hunting effort of Michigan waterfowl hunters in 2009 from a USFWS survey. These estimates were based on responses received from a random sample of HIP registrants. Estimates of hunter numbers from the two surveys were not significantly different (Table 13). In contrast, estimates of hunting effort and harvest among duck hunters were significantly different between the surveys. Furthermore, estimates of hunting effort among goose hunters differed significantly between surveys. These differences may reflect unknown differences in the way the surveys were implemented.

Wright (1978) and Frawley (2012) compared estimates of waterfowl hunting activity and harvest of waterfowl hunters derived from mail surveys to information reported at mandatory check stations. Estimates of waterfowl harvest were overestimated by 100-135%, and the number of hunting trips was overestimated by 35-73%. Wright attributed the largest source of bias associated with the harvest estimate to hunters reporting the take of hunting partners, rather than only reporting their harvest.

Since 1954, the highest numbers of duck and goose hunters recorded in Michigan occurred in 1970 (Figure 3). From this peak, the current number of people hunting ducks has declined 69% (average annual decline = 3.0%), while the number of people hunting geese has declined 44% (average annual decline = 1.5%). Declining numbers of small game hunters, including waterfowl hunters, has been noted previously in Michigan and throughout the United States since the mid-1970s (Enck et al. 2000, U.S. Department of the Interior 2002,

Aiken 2004, Frawley 2006). Between 2001 and 2006, the number of hunters pursuing ducks declined 28% nationally (U.S. Fish and Wildlife Service 2010). Similarly, the number of people hunting ducks in the regular duck hunting season (first season split) declined an estimated 27% in Michigan during this same period (Figure 3). Many factors are responsible for declining waterfowl hunter numbers including increased urbanization of the human population, increased competition between hunting and other recreational activities, decreased access to private land for hunting, and loss of waterfowl habitat. Although the number of duck hunters and duck harvest has decreased since 1970, duck harvest per day of hunting effort has increased (Figure 4). Goose harvest and the mean number of geese taken per day of hunting effort also have increased gradually since the 1970s (Figure 4).

The proportion of duck hunters satisfied with their overall duck hunting experience was the same in both 2008 and 2009 (57% satisfied both years, Table 9). Moreover, similar proportions of duck hunters were satisfied with the number of ducks seen, ducks harvested, and hunting season dates in both 2008 and 2009. Goose hunters also reported similar levels of satisfaction with their overall goose hunting experience in 2008 and 2009 (54% versus 53%, Table 9). Furthermore, goose hunters in 2008 and 2009 reported similar levels of satisfaction with the number of geese seen and geese harvested.

## **ACKNOWLEDGEMENTS**

I thank all the hunters that provided information. Autumn Feldpausch, Sheree Kershaw, Theresa Riebow, and Dona Rumrill completed data entry. Marshall Strong created Figure 1. Russ Mason, Cheryl Nelson, Doug Reeves, and Mark Sargent reviewed a draft version of this report.

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Table 1. Waterfowl hunting seasons in Michigan, 2009-2010.

Species, season, and area <sup>a</sup>	Season dates
Ducks <sup>b</sup>	
North Zone (UP)	Sept. 26 – Nov. 20 and Nov. 26 – 29
Middle Zone	Oct. 3 – Nov. 29 and Dec. 5 – 6
South Zone	Oct. 10 – Dec. 6 and Jan. 2 – 3
Canada geese <sup>b,c</sup>	
Early seasons	
North Zone (UP)	Sept. 1 – 10
Middle and South zones (LP)	Sept. 1 – 15
Regular seasons	
North Zone (UP)	Sept. 16 – Oct. 30
Middle Zone	Oct. 3 – Nov. 9 and Nov. 26 – Dec. 2
South Zone	Oct. 10 – Nov. 12 and Nov. 26 – Dec. 6
Late season	
South Zone	Jan. 2 – 31

<sup>a</sup>See Figure 1 for boundaries of hunt areas.

<sup>b</sup>Ducks and geese could also be taken during a special 2-day Youth Season (September 19-20).

<sup>c</sup>Special goose hunting seasons also occurred on Goose Management Units, but these seasons affected a relatively small area.



Table 2. Number of waterfowl hunting licenses sold in Michigan, 2005-2009.

Item	Year					2008-2009 % Change
	2005	2006	2007	2008	2009	
Number of licenses sold <sup>a</sup>	60,234	60,994	59,475	58,526	58,663	0.2
Number of people buying a hunting license <sup>b,c</sup>	59,658	60,401	58,863	58,036	58,209	0.3

<sup>a</sup>The number of licenses sold is higher than the number of people buying licenses because some people purchased multiple licenses.

<sup>b</sup>A person was counted only once, regardless of how many licenses they purchased.

<sup>c</sup>Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

Table 3. Estimated number, sex, and age of active waterfowl hunters, and proportion and number of youth waterfowl hunters in Michigan, 2005-2009.<sup>a</sup>

Hunters	2005	2006	2007	2008	2009	
					Estimate	95% CL
Waterfowl <sup>b</sup>	50,431	50,230	47,748	47,384	50,064*	1,031
Males (%)	97.2	97.1	95.7	94.2	97.0*	0.7
Females (%)	2.8	2.9	3.9	3.0	3.0	0.7
Age (Years)	40.4	40.4	40.2	41.4	41.4	0.7
Youth (%) <sup>c</sup>	10.7	10.9	11.2	10.2	12.6*	1.0
Youth (No.) <sup>c</sup>	5,389	5,471	5,331	4,819	6,299*	572

<sup>a</sup>Analyses included only those people that hunted.

<sup>b</sup>People that hunted ducks or geese (active hunters).

<sup>c</sup>Hunters 10-16 years of age.

<sup>d</sup>Not available.

\*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2008 and 2009 (P<0.005).

Table 4. Estimated number of waterfowl hunters by season and region in Michigan, 2006-2009.<sup>a</sup>

Species and area (stratum)	2006	2007	2008	2009		2008-2009 % Change
				No.	95% CL	
Ducks (First split)						
UP	5,555	5,698	5,897	5,749	618	-3
NLP	18,351	16,319	16,892	17,936	984	6
SLP	22,761	21,073	21,809	23,268	1,072	7
Statewide	41,102	38,142	39,764	41,930	1,122	5
Ducks (Second split)						
UP				463	181	NA
NLP	2,838	1,855	1,934	1,899	365	-2
SLP	9,147	7,844	6,471	7,022	678	9
Statewide	11,886	9,514	8,285	9,158	774	11
Ducks (Seasons combined)						
UP	5,578	5,703	5,903	5,801	620	-2
NLP	18,634	16,689	17,100	18,288	990	7
SLP	23,915	22,331	22,704	24,078	1,081	6
Statewide	42,068	39,299	40,405	42,554	1,118	5
Geese (Early season)						
UP	1,663	2,120	1,592	1,564	333	-2
NLP	8,015	6,771	6,953	7,376	688	6
SLP	13,800	12,801	12,345	13,782	894	12
Statewide	22,747	21,093	20,084	22,023	1,061	10
Geese (Regular season)						
UP	3,075	3,659	3,145	3,169	466	1
NLP	10,022	9,388	9,716	10,776	805	11
SLP	15,015	13,637	14,871	14,548	911	-2
Statewide	26,934	25,650	26,300	27,106	1,111	3
Geese (Late season)						
UP						
NLP	950	569	445	507	191	14
SLP	9,813	7,597	6,071	6,206	642	2
Statewide	10,723	8,166	6,497	6,653	674	2
Geese (Seasons combined)						
UP	3,611	4,415	3,716	3,559	492	-4
NLP	13,456	11,738	12,123	13,637	885	12
SLP	22,210	20,835	21,122	21,665	1,045	3
Statewide	36,570	34,445	34,292	36,202	1,139	6

<sup>a</sup>The number of hunters does not add up to the statewide total because hunters can hunt in more than one region. Regions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

\*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2008 and 2009 ( $P < 0.005$ ).

Table 5. Estimated amount of waterfowl hunter effort (days afield) by season and region, 2006-2009.<sup>a</sup>

Species and area (stratum)	2006	2007	2008	2009		2008-2009 % Change
				No.	95% CL	
Ducks (First split)						
UP	32,366	37,279	34,630	34,669	5,375	0
NLP	122,187	105,988	113,509	118,951	10,680	5
SLP	167,286	151,414	148,105	158,734	11,507	7
Statewide	321,838	294,681	296,244	312,353	15,672	5
Ducks (Second split)						
UP				1,259	567	NA
NLP	5,841	3,129	2,920	2,966	659	2
SLP	18,459	11,888	9,775	9,802	1,057	0
Statewide	24,299	15,018	12,695	14,027	1,375	10
Ducks (Seasons combined)						
UP	32,951	37,279	34,634	35,927	5,633	4
NLP	128,839	109,117	116,434	121,914	10,867	5
SLP	184,347	163,302	157,870	168,539	12,031	7
Statewide	346,137	309,699	308,939	326,380	16,206	6
Geese (Early season)						
UP	5,471	7,988	5,742	6,073	1,599	6
NLP	31,725	29,809	25,793	27,868	3,416	8
SLP	54,256	50,956	45,194	51,787	4,667	15
Statewide	91,453	88,753	76,729	85,727	5,792	12
Geese (Regular season)						
UP	16,676	27,795	18,795	20,484	4,303	9
NLP	55,009	49,547	58,468	62,943	7,244	8
SLP	75,221	66,334	82,754	79,795	7,587	-4
Statewide	146,907	143,677	160,017	163,222	10,966	2
Geese (Late season)						
UP						
NLP	3,304	1,894	1,030	1,592	857	54
SLP	38,544	29,271	21,844	20,609	3,285	-6
Statewide	41,847	31,166	22,875	22,201	3,443	-3
Geese (Seasons combined)						
UP	22,169	35,890	24,488	26,502	5,418	8
NLP	90,171	81,457	85,197	92,303	9,378	8
SLP	167,866	146,248	149,936	152,345	12,300	2
Statewide	280,207	263,595	259,620	271,150	15,771	4

<sup>a</sup>Regions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

\*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2008 and 2009 (P<0.005).

Table 6. Estimated waterfowl harvest by season and region in Michigan, 2006-2009.<sup>a</sup>

Species and area (stratum)	2006	2007	2008	2009		2008- 2009 % Change
				No.	95% CL	
Ducks (First split)						
UP	38,194	46,586	37,290	37,196	8,012	0
NLP	168,993	140,932	132,361	149,538	16,513	13
SLP	183,215	162,350	173,402	190,827	19,286	10
Statewide	390,401	349,868	343,052	377,561	26,815	10
Ducks (Second split)						
UP				1,599	982	NA
NLP	7,978	4,686	4,289	4,870	1,581	14
SLP	22,491	19,508	16,263	15,568	2,588	-4
Statewide	30,468	24,195	20,553	22,036	3,336	7
Ducks (Seasons combined)						
UP	38,425	46,591	37,295	38,790	8,434	4
NLP	177,375	145,626	136,659	154,380	16,891	13
SLP	205,069	181,846	189,650	206,427	20,427	9
Statewide	420,869	374,062	363,605	399,598	28,130	10
Geese (Early season)						
UP	3,426	7,879	4,338	3,644	1,631	-16
NLP	30,707	26,402	27,357	31,537	5,268	15
SLP	52,539	46,499	49,271	53,530	6,931	9
Statewide	86,672	80,780	80,966	88,712	8,916	10
Geese (Regular season)						
UP	7,336	16,408	8,035	9,531	2,776	19
NLP	32,717	25,636	32,154	31,815	4,897	-1
SLP	40,830	39,667	48,464	47,274	6,329	-2
Statewide	80,883	81,712	88,652	88,620	8,370	0
Geese (Late season)						
UP						
NLP	1,909	1,133	673	814	556	21
SLP	23,049	19,179	13,766	16,113	4,103	17
Statewide	24,957	20,312	14,439	16,927	4,188	17
Geese (Seasons combined)						
UP	10,743	24,254	12,345	13,165	4,008	7
NLP	65,314	53,169	60,075	64,146	8,939	7
SLP	116,456	105,380	111,638	116,948	14,182	5
Statewide	192,513	182,804	184,058	194,259	17,213	6

<sup>a</sup>Regions did not match hunting zones; see Tables 7 and 8 for estimates by hunting zones.

\*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2008 and 2009 (P&lt;0.005).

Table 7. Estimated number of duck hunters, hunting effort, and ducks harvested, summarized by season and management zone in Michigan, 2009.

Season and waterfowl zone <sup>a</sup>	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
First split						
North	5,749	626	34,316	5,389	37,074	8,028
Middle	11,502	845	63,793	7,606	65,516	9,615
South	30,079	1,136	214,243	13,615	274,971	23,593
Statewide	41,930	1,122	312,353	15,672	377,561	26,815
Second split						
North	500	191	1,281	572	1,586	982
Middle	1,243	301	1,991	529	3,152	1,228
South	7,646	710	10,755	1,122	17,298	2,821
Statewide	9,158	774	14,027	1,375	22,036	3,336
Seasons combined						
North	5,845	630	35,600	5,646	38,663	8,449
Middle	11,670	849	65,793	7,799	68,671	10,068
South	30,955	1,140	224,988	14,079	292,264	24,613
Statewide	42,554	1,118	326,380	16,206	399,598	28,130

<sup>a</sup>Estimates for the zones do not equal estimates for the areas in Tables 4-6 because hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest.

\*Non-overlapping 95% confidence intervals indicated estimates declined significantly between 2008 and 2009 ( $P < 0.005$ ).

Table 8. Estimated number of goose hunters, hunting effort, and geese harvested, summarized by season and management zone in Michigan, 2009.

Season and waterfowl zone <sup>a</sup>	Hunters		Effort		Harvest	
	No.	95% CL	No.	95% CL	No.	95% CL
Early						
North	1,734	333	6,674	1,599	4,038	1,631
Middle	3,808	485	14,025	2,389	16,066	3,889
South	17,184	933	65,029	4,933	68,607	7,408
Statewide	22,023	1,061	85,727	5,792	88,712	8,916
Regular						
North	3,519	466	22,363	4,303	10,522	2,776
Middle	5,669	581	28,634	4,592	15,351	3,389
South	19,650	976	112,225	8,916	62,747	6,858
Statewide	27,106	1,111	163,222	10,966	88,620	8,370
Late						
North	0	0	0	0	0	0
Middle	0	0	0	0	0	0
South	6,713	651	22,201	3,370	16,927	4,144
Statewide	6,653	674	22,201	3,443	16,927	4,188

<sup>a</sup>Estimates for the zones do not equal estimates for the areas in Tables 4-6 because hunting effort and birds harvested from unknown locations were allocated among areas in proportion to the known effort and harvest.

Table 9. Level of satisfaction among waterfowl hunters with the 2008 and 2009 waterfowl hunting seasons and hunting regulations in Michigan (summarized as the proportion of active waterfowl hunters reporting various levels of satisfaction).<sup>a</sup>

Hunting experience or regulation	Level of satisfaction and year											
	Very satisfied or somewhat satisfied			Neutral			Somewhat dissatisfied or strongly dissatisfied			No answer		
	2008	2009		2008	2009		2008	2009		2008	2009	
		95%			95%			95%			95%	
	%	%	CL	%	%	CL	%	%	CL	%	%	CL
Ducks seen	42	43	2	18	18	2	38*	38	2	1	1	0
Ducks harvested	28	29	2	22	22	2	45	43	2	5	6	1
Duck hunting experience	57	57	2	21	21	2	20	20	2	2	2	1
Duck season dates	48	46	2	29	31	2	20	20	2	2	3	1
Length of duck season	54	53	2	26	27	2	18	17	2	2	3	1
Daily duck limit	58	59	2	28	27	2	12	11	1	2	3	1
Geese seen	60	58	2	15	17	2	23	23	2	2	2	1
Geese harvested	34	33	2	20	21	2	40	38	2	5	8	1
Goose hunting experience	54	53	2	22	23	2	23	22	2	1	2	1

<sup>a</sup>Estimates associated with duck hunting were derived from answers provided by people that had hunted ducks, while estimates associated with goose hunting were derived from answers received from people that had hunted geese.

\*Non-overlapping 95% confidence intervals indicated estimates differed significantly between 2008 and 2009 (P<0.005).

Table 10. Preferred opening date of the 2010 duck hunting season in Michigan among active 2009 duck hunters, summarized by their preferred duck hunt zone.

Opening date	Preferred hunt zone											
	North Zone				Middle Zone				South Zone			
	Hunters (%)	95% CL	Hunters (No.)	95% CL	Hunters (%)	95% CL	Hunters (No.)	95% CL	Hunters (%)	95% CL	Hunters (No.)	95% CL
Sep. 25	45	6	2,015	387	30	4	2,913	460	20	2	5,539	624
Oct. 2	29	6	1,311	311	33	4	3,145	473	19	2	5,362	612
Oct. 9	9	4	409	174	14	3	1,368	316	26	2	7,292	702
Oct. 16	3	2	142	102	8	2	733	232	17	2	4,735	577
Undecided	10	4	457	186	12	3	1,169	297	13	2	3,564	509
Other	2	2	105	90	2	1	166	112	3	1	793	241
No answer	1	1	61	67	1	1	125	98	1	1	348	161



Table 11. Proportion and number of 2009 waterfowl hunters that preferred a split season or a continuous season for the 2010 waterfowl hunting season in Michigan.

Option	Hunters preferring option			
	%	95% CL	No.	95% CL
Split season and have dates similar to 2009	36	2	15,242	953
No split season (i.e., continuous season)	30	2	12,869	887
Split season but split differently than 2009	13	1	5,674	626
Undecided	18	2	7,559	715
No answer	3	1	1,210	299

Table 12. Reason why youth (10-15 years old) did not participate in the 2009 youth waterfowl hunting season in Michigan.

Reason	Youth hunters			
	%	95% CL	No.	95% CL
No time to hunt because of other non-hunting activities	36	5	3,437	474
Did not know about youth season	21	4	2,009	389
No time to hunt because of other hunting activities	20	4	1,888	379
No answer	16	4	1,476	342
No adults available to take youth	13	3	1,234	316
Not interested	10	3	992	286
Other reason	10	3	920	276
No place to hunt	6	2	605	227
Too few waterfowl in hunt area	5	2	436	194
No access to hunting equipment	4	2	339	172
Hunt area too crowded	2	1	145	113

Table 13. Comparison of estimates of waterfowl hunter numbers, hunting effort, and harvest in Michigan during 2008 from the USFWS harvest survey and the Michigan waterfowl harvest survey.

Estimate	USFWS survey <sup>a</sup>		Michigan survey		Difference (%)
	No.	95% CL	No.	95% CL	
Ducks					
Hunters	41,100	4,110	42,554	1,118	4
Hunting effort	251,100	30,132	326,380	16,206	30*
Harvest	308,900	40,157	399,598	28,130	29*
Geese					
Hunters	35,400	3,540	36,202	1,139	2
Hunting effort	214,700	30,058	271,150	15,771	26*
Harvest	162,300	24,345	194,259	17,213	20
Ducks and geese combined					
Hunters	47,800	4,302	50,064	1,031	5

<sup>a</sup>Raftovich et al. 2010.

\*Non-overlapping 95% confidence intervals indicated estimates from the surveys were significantly different (P<0.005).

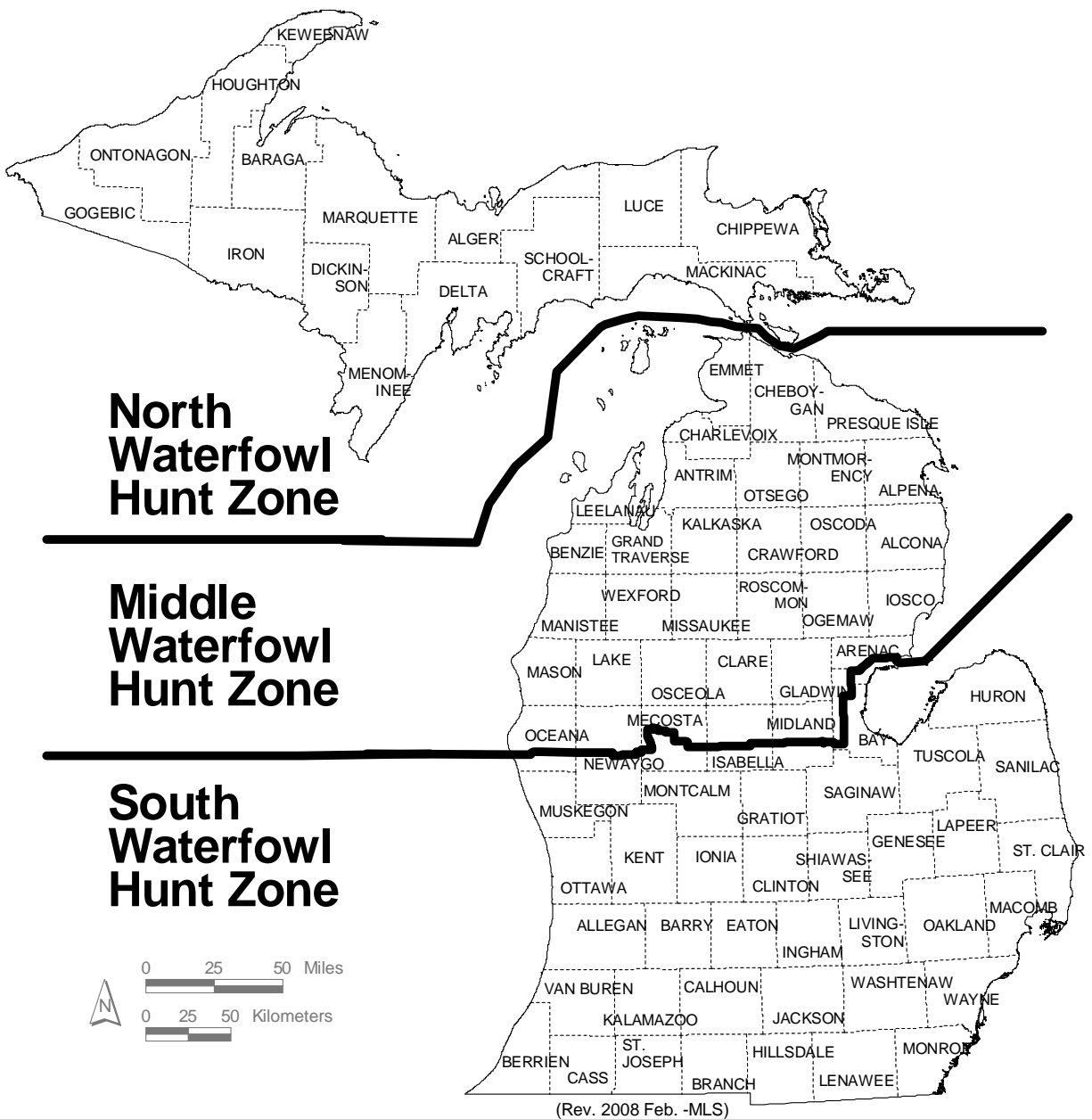


Figure 1. Areas used to summarize the waterfowl survey data for the 2009 waterfowl hunting seasons in Michigan. Regional boundaries did not match the waterfowl management hunting zones.

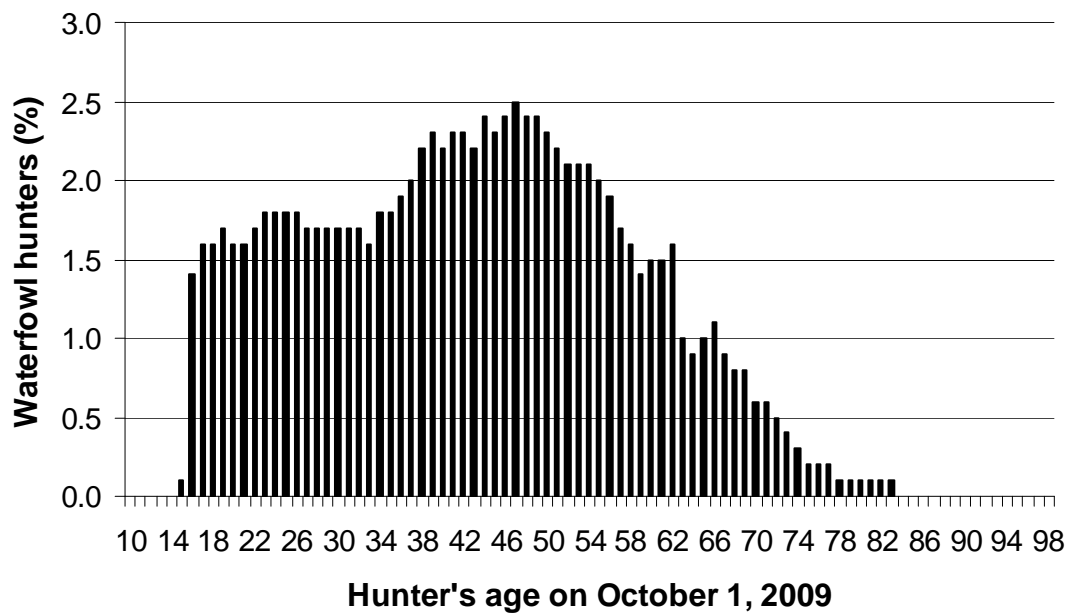


Figure 2. Age of people that purchased a waterfowl hunting license in Michigan for the 2009 hunting seasons ( $\bar{x} = 43$  years). Hunters 10-15 years of age could legally hunt waterfowl without a waterfowl hunting license.

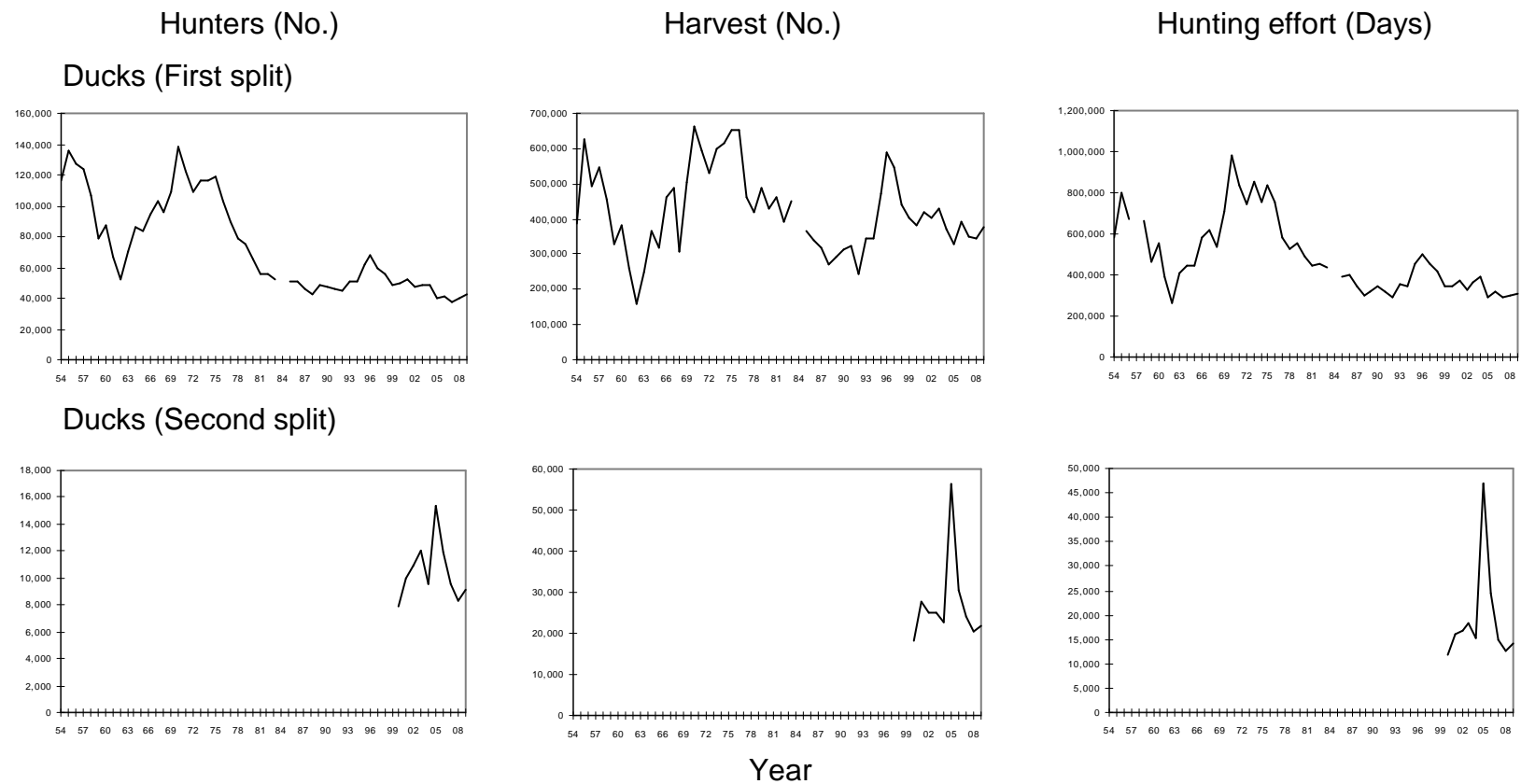


Figure 3. Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2009. No estimates were available or no seasons existed during years when no data are plotted.

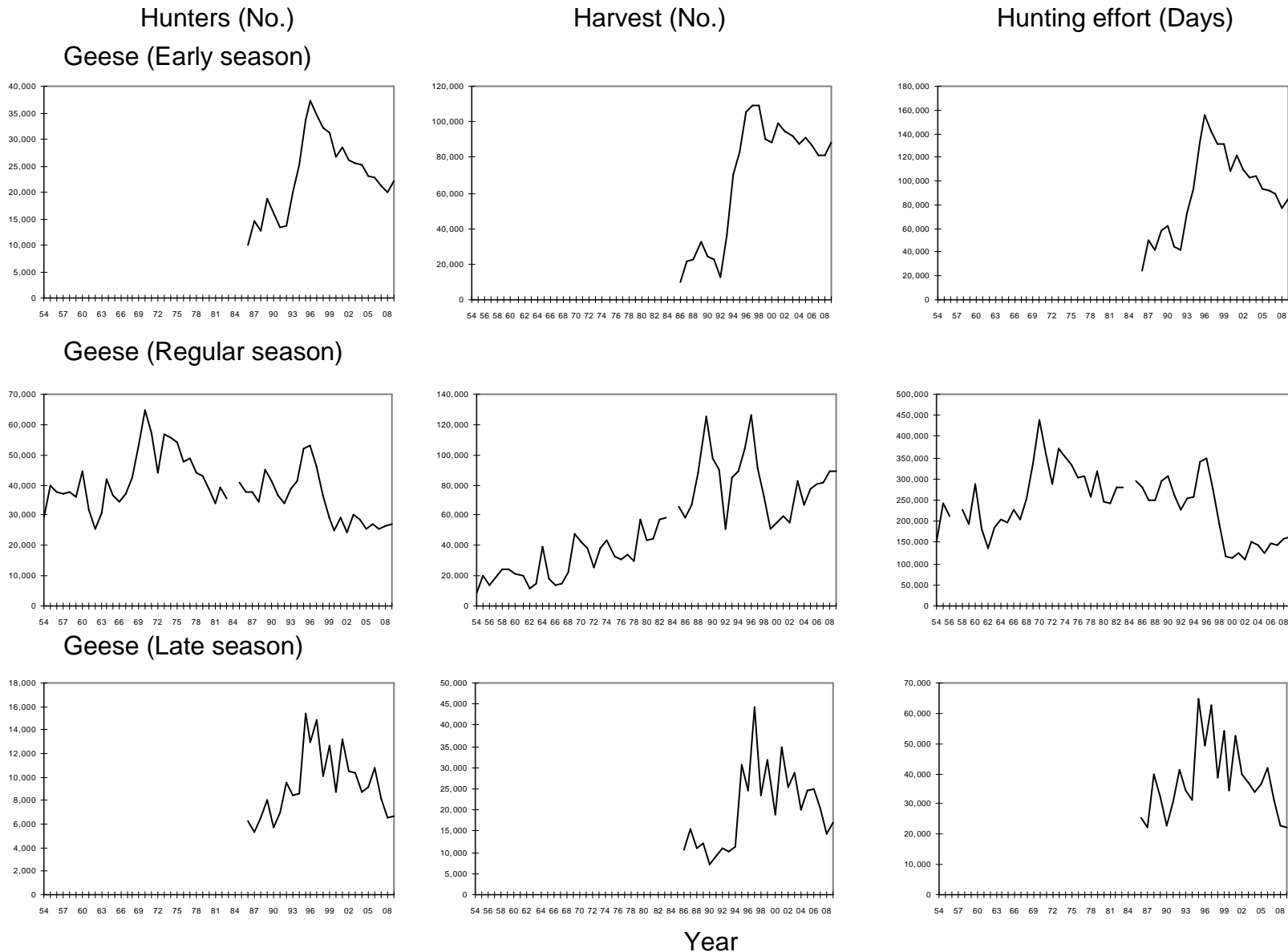


Figure 3 (continued). Estimated number of hunters, harvest, and hunting effort in Michigan during the waterfowl hunting seasons, 1954-2009. No estimates were available or no seasons existed during years when no data are plotted.

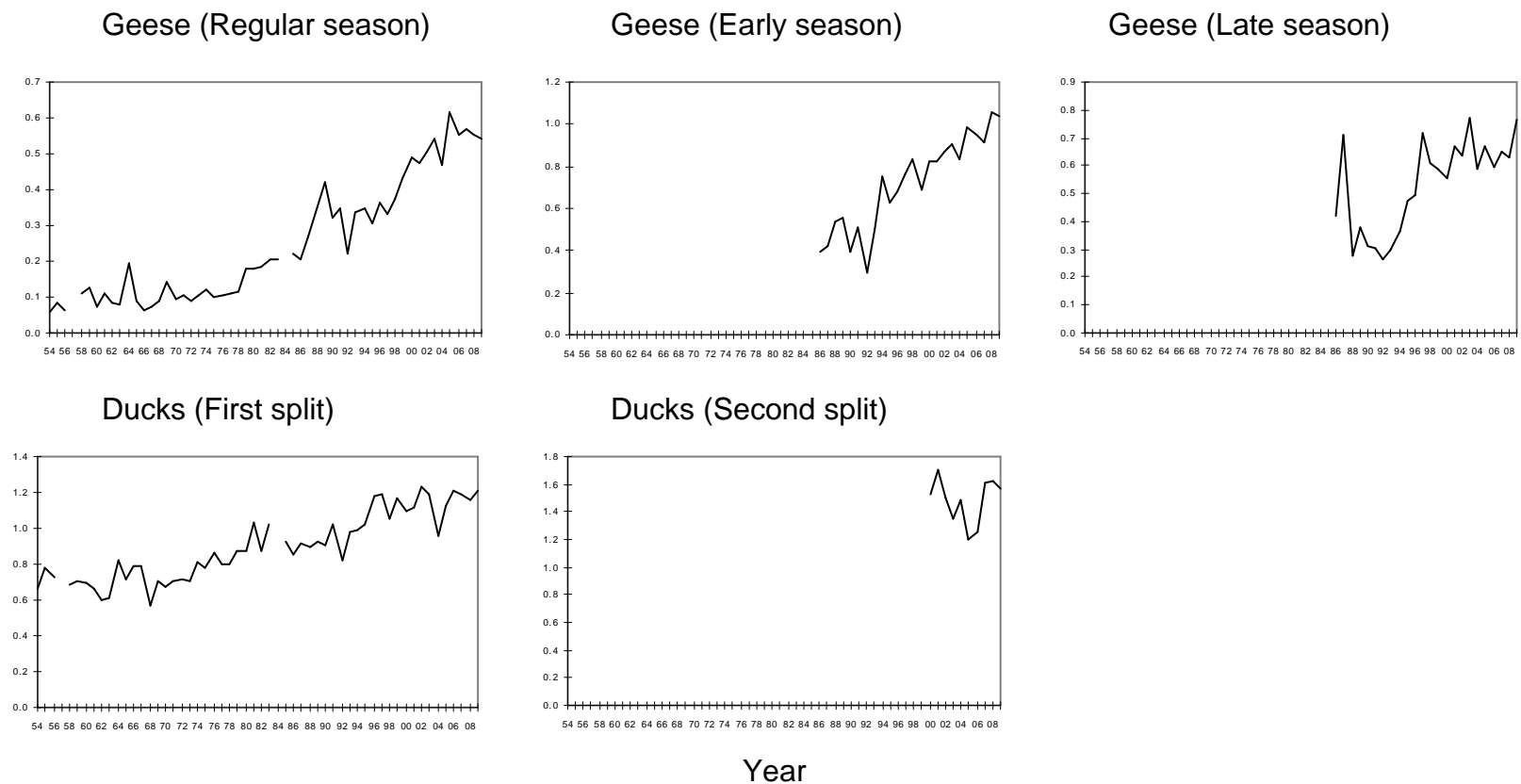


Figure 4. Estimated harvest per effort in Michigan during the waterfowl hunting seasons, 1954-2009. No estimates were available or no seasons existed during years when no data are plotted.

## Appendix A

### 2009-2010 Waterfowl Harvest Questionnaire





2009-2010 WATERFOWL HARVEST REPORT

This information is requested under authority of Part 435, 1994 PA 451, M.C.L. 324.43539.



*It is important that you complete this questionnaire even if you did not hunt any waterfowl. Please report only **your** hunting activities and the birds that **you** harvested.*

1. Did you hunt ducks or geese in Michigan from September 1, 2009, through January 31, 2010 (2009-2010 hunting season)?

<sup>1</sup> ☐ Yes. Please complete the table below and answer questions on next page.

<sup>2</sup> ☐ No. Skip to question 3.

SEASON SEGMENT <i>(Check box if you hunted during the season. Note the duck season is divided into two segments and goose season divided into three segments. Dates and areas of each segment listed below.)</i>	COUNTY HUNTED <i>(For each season you hunted, list the counties hunted on separate lines.)</i>	MANAGEMENT ZONE <i>(See figure on last page for zone boundaries.)</i>			DAYS HUNTED	NUMBER OF BIRDS TAKEN	LAND TYPE		
		North (UP)	Middle (NLP)	South (SLP)			Private	Public	Both
<sup>0</sup> <input checked="" type="checkbox"/> <b>Example</b>	1 Jackson	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>	5	12	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input checked="" type="checkbox"/>
<sup>1</sup> <input type="checkbox"/> <b>Duck</b> First Portion of Regular Season Sept 26 – Nov 20 (North Zone) Oct 3 – Nov. 29 (Middle Zone) Oct 10 – Dec 6 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<sup>2</sup> <input type="checkbox"/> <b>Duck</b> Late Split Portion of Regular Season (2-4 days only) Nov 26-29 (North Zone) Dec 5-6 (Middle Zone) Jan 2-3 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<sup>3</sup> <input type="checkbox"/> <b>Goose</b> Early Season Sept 1-10 (North Zone) Sept 1-15 (Middle Zone) Sept 1-15 (South Zone)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<sup>4</sup> <input type="checkbox"/> <b>Goose</b> Regular Season Sept 16-Oct 30 (North Zone) Oct 3-Nov 9 & Nov 26-Dec 2 (Middle) Oct 10-Nov 12 & Nov 26-Dec 6 (South)	1	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
<sup>5</sup> <input type="checkbox"/> <b>Goose</b> Late Season Jan 2-31 (South Zone)	1			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	2			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	3			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>
	4			3 <input type="checkbox"/>			1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>

2. Please indicate how satisfied or dissatisfied you were with the following for the 2009-2010 waterfowl hunting season and hunting regulations: *(Select one choice per item.)*

	Very Satisfied	Somewhat Satisfied	Neutral	Somewhat Dissatisfied	Strongly Dissatisfied	Not Applicable
a. Number of <u>ducks</u> you saw.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
b. Number of <u>ducks</u> you harvested.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
c. Your overall <u>duck</u> hunting experience.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
d. <u>Duck</u> season dates.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
e. The number of days in the <u>duck</u> season.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
f. The size of the daily <u>duck</u> limit.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
g. Number of <u>geese</u> you saw.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
h. Number of <u>geese</u> you harvested.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>
i. Your overall <u>goose</u> hunting experience.	1 <input type="checkbox"/>	2 <input type="checkbox"/>	3 <input type="checkbox"/>	4 <input type="checkbox"/>	5 <input type="checkbox"/>	6 <input type="checkbox"/>

Questions continue on next page.

3. What is your preferred zone to hunt ducks in Michigan? (Check one.)
- ☐ North Zone  
(Upper Peninsula)

☐ Middle Zone  
(Northern Lower Peninsula)

☐ South Zone  
(Southern Lower Peninsula)
4. For your preferred zone to hunt ducks, as in the previous question, please indicate the opening date you would prefer for that zone for the 2010-2011 duck season. (Check one.)
- ☐ Sept. 25

☐ October 2

☐ October 9

☐ October 16

☐ Undecided

☐ Other: \_\_\_\_\_
5. The duck season was 60 days in 2009-2010 and was split into two segments in each zone (for example, Oct 10 – Dec 6 and Jan 2-3 in the South Zone). For your preferred zone to hunt ducks, please indicate which option you would prefer for the 2010-2011 duck season? (Check one.)
- ☐ Split the duck season and maintain dates similar to the 2009-2010 seasons (for example, include a 2-4 day late hunt).

☐ Do not split the season and instead run duck season dates consecutively without a 2-4 day late hunt.

☐ Continue to split the season into 2 periods, but time the split differently. (Please specify alternative dates for the 2010-2011 duck season: \_\_\_\_\_).

☐ Undecided.
6. If you are a youth (adults skip to question 8), did you hunt during Michigan's Youth Waterfowl Hunting weekend (September 19-20, 2009)? Eligible youth were 10-15 years old during the youth season.
- ☐ Yes, skip to question 9.

☐ No, proceed to question 7.
7. If you are a youth, what were the primary reasons you did not participate in the Youth Waterfowl Hunt during the 2009-2010 season? (Check all that apply.)
- ☐ I did not have time to hunt because I was involved with other hunting activities.

☐ I did not have time to hunt because I was involved with other non-hunting activities.

☐ I was not interested in participating.

☐ I did not know there was a youth waterfowl hunt.

☐ No adults were able to take me.

☐ I did not have a place to hunt.

☐ Too crowded where I hunt.

☐ Too few waterfowl where I hunt.

☐ I did not have access to hunting equipment.

☐ Other (Please specify \_\_\_\_\_).
8. If you are an adult, how many youth did you take waterfowl hunting during Michigan's Youth Waterfowl Hunting weekend (September 19-20, 2009)?
- ☐ None

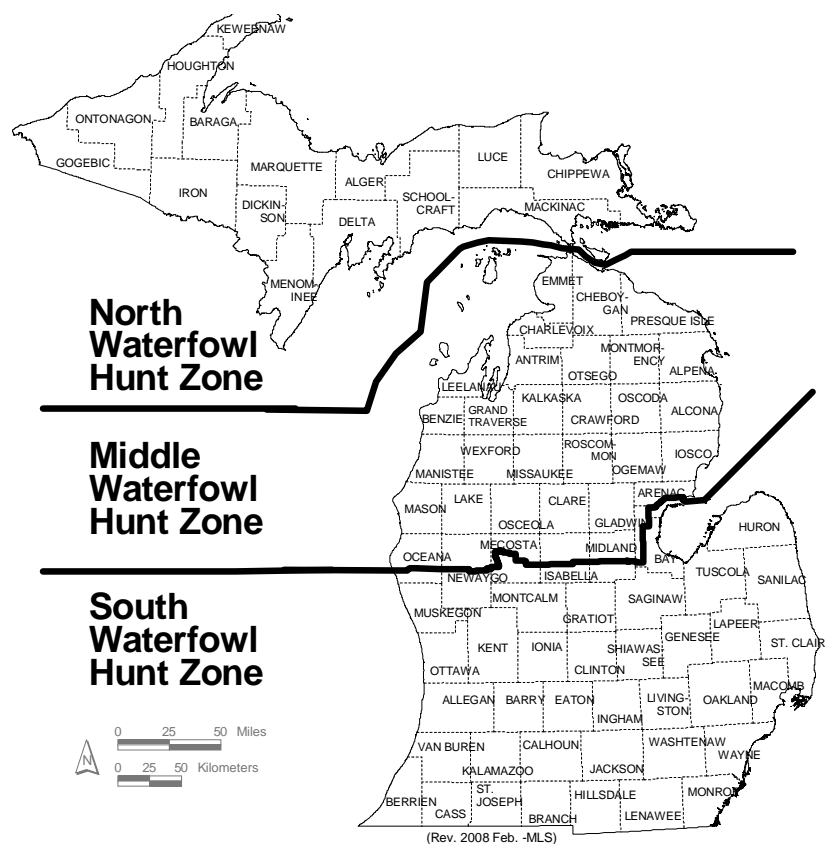
Record the number of youth : \_\_\_\_\_
9. What would be your preferred weekend for the Federal Youth Waterfowl Weekend hunt in 2010? (Check one.)
- ☐ Sept. 11-12

☐ Sept. 18-19

☐ Undecided

☐ Eliminate season

☐ Other: \_\_\_\_\_



Please return questionnaire in the enclosed postage-paid envelope.  
Thanks.